NASA Procedural Requirements

NPR 8705.2B
Effective Date: May 06, 2008
Expiration Date: May 06, 2013

COMPLIANCE IS MANDATORY

Printable Format (PDF)

Request Notification of Change (NASA Only)

Subject: Human-Rating Requirements for Space Systems

Responsible Office: Office of Safety and Mission Assurance

| TOC | Preface | Chapter1 | Chapter2 | Chapter3 | AppendixA | AppendixB | AppendixC | AppendixD | AppendixE | AppendixF | ALL |

Preface

P.1 Purpose

P.1.1 NASA's policy is to protect the health and safety of humans involved in or exposed to space activities, specifically the public, crew, passengers, and ground personnel. This policy is implemented through the application of NASA directives and standards.

P.1.2 The significant monetary investment for complex space hardware requires all missions to meet high standards of reliability and mission success. The purpose of this NASA Procedural Requirements (NPR) document is to define and implement the additional processes, procedures, and requirements necessary to produce human-rated space systems that protect the safety of crew members and passengers on NASA space missions.

P.1.3 A human-rated system accommodates human needs, effectively utilizes human capabilities, controls hazards and manages safety risk associated with human spaceflight, and provides, to the maximum extent practical, the capability to safely recover the crew from hazardous situations. Human-rating is not and should not be construed as certification for any activities other than carefully managed missions where safety risks are evaluated and determined to be acceptable for human spaceflight.

P.1.4 Human-rating must be an integral part of all program activities throughout the life cycle of the system, including design and development; test and verification; program management and control; flight readiness certification; mission operations; sustaining engineering; maintenance, upgrades, and disposal.

P.1.5 This NPR requires applicable space systems as defined in paragraph P.2 to obtain a Human-Rating Certification prior to the first crewed mission and maintain the rating throughout the system life cycle.

P.2 Applicability

P.2.1 The human-rating requirements in this NPR apply to the development and operation of crewed space systems developed by NASA used to conduct NASA human spaceflight missions. This NPR may apply to other crewed space systems when documented in separate requirements or agreements.

Note 1: The Human-Rating Certification is granted to the crewed space system but the certification process and requirements affect functions and elements of other mission systems, such as control centers, launch pads, and communication systems. Refer to the definitions in Appendix A for further information. The types of crewed space systems that require a Human-Rating Certification (per this NPR) include, but are not limited to, spacecraft and their launch vehicles, planetary bases and other planetary surface mobility systems that provide life support functions, and Extravehicular Activity (EVA) suits. Note 2: As defined in this NPR, a crewed space system consists of all the system elements that are occupied by the crew during the mission and provide life support functions for the crew. The crewed space system also includes all system elements that are physically attached to the crewed-occupied element during the mission, while the crew is in the vehicle/system. Each independent element is not required to

obtain a Human-Rating Certification - the certification is for the entire crewed space system. However, the NASA Program Manager may elect to seek independent certification of elements of the crewed system if the procurement process makes this approach more logical. See Appendix A, definition of "crewed space system," for examples as they relate to Human-Rating Certification. Note 3: Human-Rating Certifications, per this NPR, are based on reference missions. During the reference missions, the crewed space system interfaces with other systems (control centers, launch pads, space communication systems). Some of the requirements in this NPR, such as failure tolerance and inadvertent action requirements, cross the interface to other systems. The implementation of those requirements (across the interface) would be part of the Human-Rating Certification for the crewed space system. Therefore, the other systems that are part of the reference mission, such as control centers and launch pads, do not require a separate Human-Rating Certification per this NPR. Note 4: When multiple crewed elements are part of the reference mission, the NASA Program Manager may elect to define multiple crewed systems, each with its own Human-Rating Certification. Note 5: Some Human-Rating Certifications may be based on reference missions with generic capabilities, such as a spacecraft mission to grapple and service satellites, or a station/planetary outpost with the potential for multiple types of visiting vehicles. For these certifications, the NASA Program Manager may develop program documentation (such as interface requirements or mission safety requirements) to implement the requirements and capabilities in this NPR for multiple types of systems that may physically attach to the human-rated system during the mission.

P.2.2 The Space Shuttle, the International Space Station (ISS), and Soyuz spacecraft are not required to obtain a Human-Rating Certification in accordance with this NPR. These programs utilize existing policies, procedures, and requirements to certify their systems for NASA missions.

Note 1: All ISS visiting spacecraft are required to meet the ISS interface requirements (previously called "visiting vehicle requirements"). The Human-Rating Certification for a spacecraft going to ISS considers the ISS as a previously certified system. A spacecraft human-rating does not supersede or obviate the need to meet requirements established by other spacecraft for visitation/docking/proximity operations.

P.2.3 In cases where system applicability, as defined in P.2.1 and P.2.2, is not clear, the Program Manager obtains a determination of applicability for human-rating in accordance with this NPR from the NASA Associate Administrator, as chair of the Agency Program Management Council (PMC).

P.2.4 The requirements in this NPR apply to internationally provided space systems only when documented in distinct separate agreements, such as joint or multilateral agreements.

P.2.5 For space systems that require a Human-Rating Certification, the Program Manager is responsible for compliance with this NPR. The Program Manager uses program requirements documents, specifications, contract clauses, and statements of work to direct contractors to comply with this NPR.

P.2.6 The requirements in this NPR supersede any conflicting requirements imposed by other NASA procedural requirements and standards.

P.2.7 The requirements in this NPR supplement requirements imposed by other Federal Government agencies.

P.2.8 In this NPR, a requirement is identified by "shall," descriptive material by "is," and permission by "may."

P.2.9 Requests for exceptions and waivers to this NPR require the approvals described in paragraph 1.4 of this NPR. In the case of unresolved dissenting opinions, the NASA Associate Administrator, as chair of the Agency PMC, dispositions the requests.

P.2.10 This edition of the NPR addresses the state of knowledge concerning human-rated systems at the time of release. It does not completely address all of the unique requirements that may be required for future capabilities such as lunar surface systems and systems developed for missions to Mars. Future revisions of this NPR are necessary to develop and document those additional requirements.

P.3 Authority

a. 42 U.S.C. 2473 (c)(1), Section 203 (c)(1) of the National Aeronautics and Space Act of 1958, as amended.

b. NPD 7120.4, Program/Project Management.

c. NPD 8700.1, NASA Policy for Safety and Mission Success.

P.4 Applicable Documents

a. NASA-Standard-3000 Volume I - II, Man-Systems Integration Standards.

b. NASA-Standard-3001 Volume I, Space Flight Human Systems: Crew Health.

c. FAA HFDS - Human Factors Design Standard.

d. MIL-STD-1472 Department of Defense Design Criteria Standard - Human Engineering.

P.5 Measurement/Verification

Verification of program compliance with the requirements contained within this NPR is performed in conjunction with selected milestone reviews (System Requirements Review (SRR), System Definition Review (SDR), Preliminary Design Review (PDR), Critical Design Review (CDR), System Integration Review (SIR) and the Operational Readiness Review (ORR)) conducted in accordance with the requirements of NPR 7120.5, NASA Space Flight Program and Project Management Requirements, and NPR 7123.1, NASA Systems Engineering Processes and Requirements. This NPR specifies development of products that are reviewed at each of the selected milestone reviews. The adequacy of those products and the acceptability of progress toward Human-Rating Certification are used to verify compliance with this NPR. In addition, the requirements and processes defined within this NPR are subject to audit and assessment in accordance with the requirements contained within NPR 8705.6, Safety and Mission Assurance Audits, Reviews, and Assessments.

P.6 Cancellation

NPR 8705.2A, dated February 7, 2005.

/S/
Bryan O'Connor
Chief, Safety and Mission Assurance

| TOC | Preface | Chapter1 | Chapter2 | Chapter3 | AppendixA | AppendixB | AppendixC | AppendixD | AppendixE | AppendixF | ALL |

| NODIS Library | Program Management(8000s) | Search |

DISTRIBUTION:
NODIS